

Remarks/Arguments

Reconsideration of this application, as amended, is respectfully requested.

Claims 1, 3-9 and 11-16 are pending in this application.

Claims 3-8 stand rejected under 35 U.S.C. 112, second paragraph, as being indefinite for the reason that claim 3 does not depend from any claim as presented in the previous amendment. It is noted that claim 3 has been amended to depend from claim 1, as was intended by applicant (see statement in paragraph 4 of Remarks/Arguments section of the amendment filed 26 July 2004) and as suggested by the Examiner. Thus, these claims are now thought to clearly comply with 35 U.S.C. 112, second paragraph.

Claims 1, 3-4, 9, 11 and 12 stand rejected under 35 U.S.C. 103(a) as being unpatentable over **applicant's admitted prior art** in view of Lehde and Moskowitz et al. '818, with the Examiner proposing that it would have been obvious to one skilled in the art to have **modified the gearbox of applicant's prior art admission** by employing the contaminant collector of Lehde in order to collect metal particles and then **to modify** Lehde by mounting the contaminant collector for rotation on the shaft, i. e., interchanging the spiral groove portion 63 and the magnet 60 of Lehde in view of the teaching of Moskowitz. It is respectfully submitted that this rejection is in error as the environments of Lehde and Moskowitz are far different from each other and from that in which applicant's claimed contaminant collector, as set forth in each of independent claims 1 and 9, is employed and it is not seen how teachings from these sources would have made obvious the proposed combination.

Specifically, the known environment, set forth in each of claims 1 and 9, in which applicant's claimed contaminant collector is used is that of a gear box having a bottom wall including a low section through which a rotatable drive shaft, that is coupled to gearing, extends, with a seal being provided between the drive shaft and the bottom wall for preventing leakage along the shaft, and with the contaminant collector having a magnetic characteristic and being mounted for rotation with the drive shaft at a location closely adjacent a top surface of the seal.

As concerns Lehde, the environment in which the so-called contaminant collector is employed is that of a magnetic clutch or brake. With reference to the embodiment depicted in FIG. 1, the clutch/brake includes a first shaft 1 having a hat-

like tubular casing 2 fixed to a bottom end thereof and a cylindrical core 3 located within and secured to the top of the casing 2 so as to define an annular passage 5 between the casing 2 and core 3 and joined to a cavity 5' located beneath the core 3. The casing 2 and core 3 are both made of **magnetizable** material and an electro-magnet 9, in the shape of a toroid, is supported within a space defined by the intersection of top and side walls of the tubular casing 2 and a reduced diameter top portion of the core 3. The bottom of the tubular casing 2 is fixed to the top of a bearing housing 6. **A second shaft 15**, made of **magnetizable** material, is located in axial alignment with the shaft 1 and is mounted for rotation in the bearing housing 6 by axially spaced, upper and lower bearings 16 and 17, with the upper bearing being located in the bottom end of a stepped bore provided in the top portion of the bearing housing 6. A bearing seal 20 is provided directly above the upper bearing 16 for retaining liquid and solid lubricants within a magnetic assembly 50, which is located within a cylindrical cavity provided in the top of the bearing housing 6 and includes lower and upper magnetic pole rings 52 and 53 disposed in sandwiching relationship to a magnetic ring 51 which is disposed about a non-magnetic spacer ring 54. A drag cup 11 is mounted to the top of the second shaft 15 and has a bottom wall 13 located within the cavity 5' and joined to an annular side wall 12 that extends into the annular cavity 5. The cavity 5, 5' is filled with a flowable magnetic material c which may comprise a mixture of lubricating oil and magnetic powder or particles, with or without a solid lubricant, or magnetic powder with a solid lubricant, or dry magnetic powder only (see column 5, lines 51-56). The clutch/brake is activated so as to effect a magnetic coupling between the upper shaft 1 and the lower shaft 15 by energizing the electro-magnet 9 which causes the flowable magnetic material c to be magnetized so as to effect a magnetic attraction between the drag cup 11, carried by the lower shaft 15, and the tubular casing 2 and core 3, carried by the upper shaft 1. In order to keep magnetic particles **of the flowable magnetic material** away from the seal 20, the lower shaft 15 is provided with a helical rib 57 located within the toroidal magnet assembly 50, and having a hand which results in an upward screwing action that insures that the magnetic particles move upward away from the sealing ring 20 and are ejected upward into the cavity 5'. Thus, it is clear that if Lehde did not use a flowable magnetic material there would be no need for the toroidal magnet assembly 50; and it is also clear that the

flowable magnetic material c **is not a contaminant**, but rather is a necessary part of the magnetic brake/clutch assembly. Further, it is clear that the assembly 50 does not actually collect magnetic particles, in the sense that applicant's claimed device collects contaminants, but rather acts to **convey** magnetic particles away from the seal 20.

As concerns Moskowitz et al., there a variety of embodiments of dynamic lip seals 32 are disclosed, which are located in fixed relationship to a rotatable shaft 10. The lip seal may itself be made from materials to form a permanent magnet, or a separate permanent magnet may be used with the lip seal in such a way that ferrofluid is retained at the lip of the seal so as to lubricate the wear region and exclude particulate contaminants, especially those which are non-magnetic, from the wear region. Thus, it is clear that the magnets in these embodiments do not act to **collect contaminants** but rather act to attract the ferrofluid, with the ferrofluid acting to exclude other fluid and particulate contaminants from the seal region. This ferrofluid may be painted onto the shaft 10 and the radial lip 32 or be provided within porous foam forming part of the seal assembly, as shown in FIGS. 15A and 16, for example. In FIGS. 13A, 13B and 13C, respective embodiments are shown which utilize separate magnets that are fixed for rotation with the shaft 10.

It is clear that the flowable magnetic material c disclosed by Lehde and the ferrofluid disclosed by Moskowitz et al. are vastly different materials and that the principles of operation of the two are much different. Specifically, Lehde does not want any magnetic particles of the flowable magnetic material c to find their way to the interface between the shaft 37 and the seal 20, while Moskowitz et al. clearly want the ferromagnetic material to be located at the interface between the shaft 10 and the lip of the seal 32. Further, it is clear that neither Lehde or Moskowitz et al. are directed to the idea of **collecting contaminants with a member having a magnetic characteristic** as is the case with applicant's claimed structure. In Lehde, the magnetic particles are **conveyed away** from the seal 35 while the oil part of the mixture is permitted to provide lubricant for the seal 20. In Moskowitz et al., the magnet acts to retain the ferrofluid in place at the seal interface with the shaft so that contaminants are excluded from the seal interface due to the fact that the interface is already occupied by the ferrofluid.

Accordingly, since the toroidal magnet assembly 50 of Lehde is intended for

use with a **magnetic clutch/brake assembly** for excluding magnetic particles of the **flowable magnetic material** c used to effect the clutch/brake coupling between the two parts which rotate relative to each other, and this exclusion is done by **conveying** the magnetic particles away from the seal, rather than **collecting contaminants** by using a collector having a magnetic characteristic, it is not thought that it would have been obvious to have looked to Lehde for a teaching of a **contaminant** collector for use in an environment having nothing to do with flowable magnetic materials for effecting a brake/clutch function. Even if it is assumed that it would have been obvious to have considered Lehde to be pertinent art for teaching the claimed contaminant collector, then it would not have been obvious to have looked to Moskowitz et al. for a teaching to mount the magnetic assembly 50 to the shaft 15 and to place the ribs 56 on the bearing housing since no benefit would result from such a modification, and no **collection of contaminant** would result, since any collected particles would merely be **conveyed** away from the seal. It is also noted that the bearing housing 6 of Lehde is **non-magnetic** and any modification to change the mounting of the magnetic assembly 50 would be complicated by this fact, which further goes away from such a modification being obvious. Further, since Moskowitz et al. teaches using the member with the magnetic characteristic to attract the ferrofluid so as retain it in place at the lip of the seal for excluding contaminant particles from the seal lip, it is not thought that it would have been obvious to one skilled in the art to have looked to Moskowitz for a teaching of how the magnetic member should be mounted in an arrangement where particles are being conveyed away from the seal.

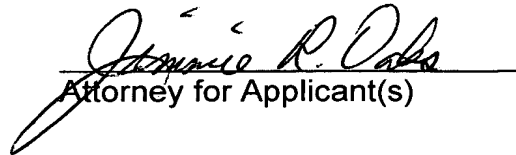
Thus, for the various reasons set forth above, claims 1 and 9 are thought clearly allowable. Since claims 3 and 4 depend respectively directly and indirectly from claim 1, and claims 11 and 12 depend respectively directly and indirectly from claim 9, claims 3, 4, 11 and 12 are also thought allowable.

The Examiner has indicated that claims 5-8 and 11-16 contain allowable subject matter. Since claims 5-8 depend indirectly from claim 1 and claims 11-16 depend indirectly from claim 9, they too are thought to be allowable.

In conclusion, it is believed that this application is in condition for allowance, and such allowance is respectfully requested.


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Respectfully,


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